

## **Chapter 3**

# **Air Quality**

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### **3.1 Primary Issues**

Sand and gravel mining, by its nature, involves moving large amounts of soil, sand, and gravel. Moving and disturbing such material can generate dust, especially under dry conditions. Many people are concerned about this dust drifting on and into their homes.

The primary issue analyzed in this section is:

- Would fugitive dust resulting from the project exceed regulatory standards at the property line or at nearby residential locations?

Issues associated with the release of arsenic are discussed in Chapter 10, Environmental Health and Safety.

### **3.2 Affected Environment**

#### **3.2.1 Regulatory Overview**

Three agencies have jurisdiction over air quality in the project area: the U.S. Environmental Protection Agency (EPA), the Washington State Department of Ecology (Ecology), and the Puget Sound Air Pollution Control Agency (PSAPCA). Although EPA and Ecology have an oversight role, PSAPCA is the primary regulatory agency and has primary permitting responsibility related to air quality issues. PSAPCA has adopted ambient air quality standards as shown in Table 3-1.

Some of the “criteria” pollutants listed in Table 3-1 are subject to two types of standards. “Primary” standards are designed to protect human health with an adequate margin of safety, while “secondary” standards are established to protect the public welfare from any known or anticipated effects associated with these pollutants, such as soiling, corrosion, or damage to vegetation. It is generally accepted that if the ambient concentrations are less

than the PSAPCA limits listed in Table 3-1, then no significant air quality impacts have occurred.

Particulate matter (dust) less than or equal to 10 micrometers in diameter (PM10) is the focus of the analysis prepared for mining operations on the site. Other pollutants listed in Table 3-1 (sulfur dioxide, carbon monoxide, etc.) would be emitted at relatively low rates from the tailpipes of trucks and other operating equipment (e.g., dozers) but are expected to have minimal impacts on ambient air quality. Therefore, they are not addressed in detail in this EIS.

PM10 is important in terms of potential health impacts because particles in this size range can be inhaled deeply into the lungs. PM10 is generated by industrial activities and operations, fuel combustion sources like residential wood burning stoves, motor vehicle engines and tires, and other sources. In July 1997, the EPA revised particulate matter standards to include particulate matter less than or equal to 2.5 micrometers in diameter (PM2.5) because particulates at this size were the greatest concern to health. However, almost all of the particulate matter generated by sand and gravel operations is larger than the fine particles considered PM2.5, and most of the particulate matter emitted is greater in diameter than the coarser particles (PM10).

### **3.2.2 Existing Air Quality**

Ecology and PSAPCA maintain a network of air quality monitoring stations throughout the Puget Sound area. In general, monitoring stations are located near where air quality problems are expected to occur, often near urban areas or close to specific large air pollution sources. A limited number of monitoring stations are located in more remote areas to provide an indication of regional or background air pollution levels.

There are no significant sources of PM10 near the project site. Because of the rural nature of the site, background or ambient PM10 concentrations are likely to be less than those reported at nearby urban monitoring stations. Since none of the existing monitoring stations are near the site, the locations of the nearest monitors were evaluated to determine which locations would best represent conditions at the project site. The nearest monitoring stations are:

- Kent (James Street and Central Avenue)
- Northeast Tacoma (5225 Tower Drive Northeast)

- Seattle, South Park (723 South Concord Street)
- Meadowdale (7252 Blackbird Drive Northeast)
- Poulsbo (6th Avenue Northeast and Fjord Drive)

Of these monitoring stations, Northeast Tacoma, Meadowdale, and Poulsbo are most comparable to the rural environment of Maury Island. The most recent PM10 data for these three stations are:

- Northeast Tacoma: 46 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) (second-highest 24-hour average)
- Meadowdale: 48  $\mu\text{g}/\text{m}^3$  (second-highest 24-hour average)
- Poulsbo: 35  $\mu\text{g}/\text{m}^3$  (second-highest 24-hour average) (PSAPCA 1997)

Based on these data, the highest (and therefore worst-case) regional PM10 level (48  $\mu\text{g}/\text{m}^3$ ) was assumed for the background PM10 concentration at the project site. Because of the rural nature of the project site, and the lack of significant PM10 sources in the vicinity, actual background PM10 concentrations are likely much lower than those used in this analysis.

### 3.3 Impacts

#### 3.3.1 Would fugitive dust resulting from the project exceed regulatory standards at the property line or at nearby residential locations?

##### 3.3.1.1 *Proposed Action*

In order to describe potential dust impacts related to mining with the Proposed Action or alternatives, it is necessary first to explain features of the proposal that relate to dust impacts, and the factors that were considered in performing air quality computer modeling for the project. These are discussed in the following sections. The section titled “PM10 Modeling Results”, following the introductory discussion of methods, discusses the specific dust impacts predicted for the Proposed Action. In general the project is not anticipated to generate significant levels of the type of dust (i.e., very small particles) that creates potential health impacts. At

mentioned earlier, the potential for the project to release air-borne arsenic is discussed in Chapter 10.

**Features of the Proposed Action Related to Air Quality Impacts.** Under the Proposed Action, sand and gravel extraction could approach 7.5 million tons per year, with nearly all of the material being sent to off-island markets via barges. The project site would provide a relatively uniform product (sand and structural fills) that would simplify how the material is extracted and processed. Essentially only a few product specifications would be produced at the site, compared to other sites that produce a wide range of products (e.g., different sizes of gravel, mixtures, etc.) that require complicated sorting, crushing, processing, and mixing equipment.

Equipment used for the project would include wheeled loaders and dozers. Wheeled loaders would be used to load materials onto trucks for on-island distribution. According to the applicant, a maximum of 20 trucks per day could be required at times to meet on-island demand. Trucking would be a very small component of the overall project, limited to on-island markets.

Dozers would be used to excavate materials. The dozers would work from the top of the slope, pushing materials down the slope to a collection point where it would be conveyed to a feeder, which delivers materials to the conveyor system for transport to the barges.

Other than the presence of a portable crushing plant at the site for 1 to 2 months every 3 or 4 years (see Chapter 2), there would be no ancillary activities that are typically associated with mining operations (e.g., rock crushers, concrete or asphalt batching plants, wood or concrete recycling operations, etc.). There would be no lifting and dropping of mined materials (except for loading of individual trucks), nor would there be batch dropping of mined materials into the conveyor system.

**Emissions Inventory.** Operational emission rates for the air quality modeling were based on a worst-case annual extraction rate of 7.5 million tons of material with equipment operating 16 hours per day (Monday through Friday) and 9 hours per day on Saturdays. The emission rates and the ambient air quality modeling were based on the production rates shown in Table 3-2.

AP-42, EPA's Compilation of Air Pollutant Emissions was used to provide the emission equations for each emission source associated with the project. Based on information provided in Chapter 2 of

this EIS, there would be two primary emission sources associated with the project: (1) line source emissions associated with trucks traveling on unpaved haul roads; and (2) area source emissions associated with dozers pushing material into the feeder/conveyor system. Worst-case annual PM10 emissions associated with the Proposed Action would be approximately 12 tons per year as shown in Table 3-3.

**Model Selection.** There are a number of air quality models that can be used for evaluating fugitive dust impacts. The selection of a model for a particular application is determined by several factors, including the nature of the emission source, the environmental setting in which the project will occur, pollutants being evaluated, and the data available to conduct the analysis. Based on conversations with PSAPCA, EPA, and Ecology, the Fugitive Dust Model (FDM) was selected for this analysis.

Three types of information are required to model air quality impacts with the FDM:

- emission source information, including emission rates and locations;
- meteorological data depicting atmospheric conditions in the vicinity of the project site; and
- receptor data, including locations at which concentrations are to be computed.

**Emission Information.** For this analysis, emission sources are grouped into two general categories:

- sand and gravel mining areas (area sources), and
- haul roads (line sources) used by trucks traveling on the site.

Figure 3-1 shows the locations of the area sources along with the project site boundaries. The three locations for the area sources reflect phases of the project operation when mining activities would be closest to the project boundary and would have the greatest potential for offsite impacts.

**Meteorological Information.** Meteorological data are used in the FDM to determine how the air transports and disperses emissions from the project. Under ideal conditions, onsite data are collected and used in the analysis. However, no onsite data are available for the proposed project and, because of the complicated topographical features surrounding the site, it was felt that a

“generic” regional data set would not be appropriate or representative of conditions at the site.

For this project, Jones & Stokes Associates developed a meteorological data set that consisted of all possible wind speed, direction, and stability class combinations, except that nighttime speed/stability classifications representing the most stable environmental conditions (Classes E and F) were not included because mining operations would not occur at night. Each of the remaining speed/stability combinations was modeled for each of 36 wind directions in 10-degree increments. Using this meteorological data set ensured that the worst-case combination of wind speed, direction, and stability would be reflected in the model results (i.e., the worst-case impacts associated with the project would be determined). Using this approach, a total of 1,084 hours of meteorological data were used in the modeling.

**Receptor Information.** Receptors are the locations at which PM10 concentrations are estimated. Two types of receptor locations were used for this project: project boundary locations and nearby offsite residential locations. A total of 298 receptor locations were modeled in the analysis.

**PM10 Modeling Results.** The Fugitive Dust Model (FDM) was used to estimate maximum (i.e., worst-case) 24-hour PM10 concentrations at three locations representative of when mining activities would be closest to the property lines and nearest the offsite residential receptors (Figure 3-1). These three locations are discussed below as Scenarios 1, 2, and 3. As described below, under all three scenarios, the worst-case 24-hour PM10 concentrations would be less than the regulatory standard.

**Scenario 1.** Under Scenario 1, mining activities were modeled in the northeast corner of the project site. The nearest receptors to this portion of the project site are individual residences of the Gold Beach community, approximately 600 to 1,000 feet east of the site. Table 3-4 shows the maximum modeled 24-hour average PM10 concentrations at the property line and at nearby residential receptors.

Modeling indicated that the maximum impact under this scenario would occur near the main access road to the project site off of Southwest 260th Street. The  $70 \mu\text{g}/\text{m}^3$  project contribution plus the assumed  $48 \mu\text{g}/\text{m}^3$  background concentration would result in a total PM10 concentration of  $118 \mu\text{g}/\text{m}^3$  at this location, which would be below the  $150 \mu\text{g}/\text{m}^3$  standard. Near the Gold Beach residential receptors, modeled PM10 concentrations ranged from

112 to 116  $\mu\text{g}/\text{m}^3$  (including 48  $\mu\text{g}/\text{m}^3$  background concentration), also below the standard.

**Scenario 2.** Under Scenario 2, mining activities were modeled in the west-central portion of the project site (Figure 3-1). The nearest residential receptors to this location are a single residence located approximately 200 feet west of the project site and residences near the southern property line.

Modeling under this scenario indicated that the maximum impact would occur at the western property line. The maximum modeled PM10 concentration at this location would be 118  $\mu\text{g}/\text{m}^3$  (including 48  $\mu\text{g}/\text{m}^3$  background concentration), the same as modeled under Scenario 1. This would also be below the 150  $\mu\text{g}/\text{m}^3$  standard. At the nearest residential locations, modeled PM10 concentrations would range from 111 to 112  $\mu\text{g}/\text{m}^3$ .

**Scenario 3.** Under Scenario 3, mining activities were modeled in the southwest corner of the project site (Figure 3-1). As with Scenario 2, the nearest residential receptors to this location are a single residence located approximately 200 feet west of the project site and residences near the southern property line.

Modeling under this scenario indicated that the maximum impact would occur near the western property line. The maximum modeled PM10 concentration at this location would be 119  $\mu\text{g}/\text{m}^3$  (including 48  $\mu\text{g}/\text{m}^3$  background concentration), which would be below the 150  $\mu\text{g}/\text{m}^3$  standard. At the nearest residential locations, modeled PM10 concentrations would range from 108 to 115  $\mu\text{g}/\text{m}^3$ .

**Annual PM10 Concentrations.** Annual average PM10 concentrations are expected to be lower than the modeled 24-hour average concentrations shown in Table 3-4 for several reasons. First, rainfall (which was not included in the emission rate estimates developed for the FDM modeling scenarios) will control some dust, reducing the overall volume of fugitive dust leaving the site. Second, average winds will provide better downwind dispersion of fugitive dust than is indicated by modeling of the worst-case 24-hour period. Because the modeled maximum 24-hour concentrations at all locations are below the regulatory standard, it is assumed that the maximum annual-average concentrations will also be less than the corresponding standard.

In addition, according to the EPA guidance document, Screening Procedures for Estimating the Air Quality Impact of Stationary Sources (EPA 1992), annual PM10 concentrations can be

conservatively estimated by multiplying 1-hour modeled PM10 concentrations by 0.1. For this analysis, the highest modeled 1-hour PM10 concentration was  $180 \mu\text{g}/\text{m}^3$ , which results in an annual PM10 concentration of  $18 \mu\text{g}/\text{m}^3$ . This agrees very well with the annual PM10 concentration as measured at the Kitsap County (Meadowdale) monitoring station ( $17 \mu\text{g}/\text{m}^3$ ).

#### **3.3.1.2 Alternatives 1 and 2**

The emission rates for Alternatives 1 and 2 were estimated by multiplying the emission rate for the Proposed Action times the ratio of the production rates for the selected alternative vs. the Proposed Action. The estimated emission rates for Alternatives 1 and 2 are shown in Table 3-3.

The fugitive dust emission rates for Alternatives 1 and 2 are less than the Proposed Action, because the daily production rate and the annual production rates would be limited by the number of loaded barges that could leave the site. Because the emission rates for each of the individual sources would be lower, it is reasonable to assume that the impacts would be lower than those modeled for the Proposed Action. Worst-case modeled PM10 concentrations for Alternatives 1 and 2, shown in Table 3-4, are all below the regulatory standards.

#### **3.3.1.3 No-Action**

Under the No-Action Alternative, mining activities at the project site would continue as they have for about the last 20 years, with annual production of approximately 20,000 tons. At these low levels of extraction, very small amounts of fugitive dust are created, and therefore air quality impacts would be minimal.

### **3.4 Mitigation Measures**

#### **3.4.1 Measures Already Proposed by the Applicant or Required by Regulation**

##### **3.4.1.1 Notice of Construction Permit**

PSAPCA would require the applicant to obtain a Notice of Construction permit, a major goal of which is to identify air pollution controls at the site. PSAPCA would require the applicant to apply Best Available Control Technology (BACT) to reduce air emissions from the site. The basic criterion used by PSAPCA to

determine the adequacy of proposed air pollution controls for a fugitive dust source is the prevention of visible dust plumes from leaving the site. Thus, PSAPCA staff would review the project to determine if the control technologies would prevent visible dust plumes from being carried past the property line. If, in PSAPCA judgement, the proposed controls would meet this criterion, they would issue a permit for the project. Once the mine is in operation, PSAPCA staff would inspect the site at regular intervals, or upon the receipt of complaints. If visible dust plumes were observed leaving the site, PSAPCA would issue a Notice of Violation that could result in a fine and possible shut-down of the project until resolution of the problem.

#### **3.4.1.2 Dust Control Plan**

The most effective mitigation for minimizing the generation of fugitive dust is to maintain the moisture content of mined material while it is being conveyed and stockpiled. These types of measures are routinely incorporated into a dust control plan that would be developed by the applicant in conjunction with PSAPCA prior to issuance of a permit for the project. The regulations pertaining to fugitive dust are contained in Sections 9.15 and 9.20 of PSAPCA's Regulation 1 and require the use of Best Available Control Technology (BACT) to achieve the goal of "no visible dust" leaving the site. The following measures would likely be incorporated into a dust control plan for the project:

- Emissions from mined materials would be minimized by maintaining a relatively high moisture content in the materials. A water-spray truck would be maintained on the site during operating hours to wet down exposed fine, dry materials if dust generation increased because of the operation of dozers or trucks on the site. Water for dust control would be purchased and brought onto the site. Water trucks hold about 5,000 gallons, and during dry conditions, the operation would use about two truckloads per day.
- A 50-foot-wide vegetated buffer would be maintained around the site's perimeter as required by King County.
- Reclaimed areas would be permanently stabilized by hydroseeding or other procedures, according to the reclamation performance standards, as soon as mining is completed.

Chapter 10, Environmental Health and Safety, provides additional dust control measures recommended to address concerns regarding

arsenic, as well as a dust monitoring plan proposed by the applicant.

#### **3.4.1.3 New Source Performance Standards**

In addition to PSAPCA regulations, the portable crushing plant, if it were to operate at a capacity greater than 150 tons per hour, would be subject to federal New Source Performance Standards (40 CFR 60 - Subpart OOO). The standards define explicit limits for dust emitted from stacks, transfer points, crushers, and building vents, and they require source tests and record-keeping.

#### **3.4.2 Additional Measures for Consideration to Further Reduce Impacts**

- The main access road to Southwest 260th Street could be paved. Paving the main haul road would reduce emissions and the potential for high PM10 concentrations near the roads.
- Once paved, the road could be washed and swept to prevent dirt and dust from accumulating and then being reentrained by passing vehicles to become airborne PM10. Directed-spray water flushing has been found to be effective in removing dirt from paved roads and therefore reducing dust emissions.
- A manual or automated wheel/vehicle-washing system could be situated so as to clean trucks and their tires as they leave the site. This would reduce the amount of material carried from the site onto the haul road.
- Expansions of buffers adjacent to Gold Beach and Sandy Shores would serve to further address community concerns about dust. This measure would also address concerns regarding noise and visual impacts (see Chapters 7 and 11).

#### **3.4.3 Cumulative Impacts**

With appropriate mitigation, the project would not significantly affect air quality, even when considered collectively with other air pollution sources from ongoing and reasonably expected activities.

### **3.4.4 Significant Unavoidable Adverse Impacts**

None are anticipated under any of the project alternatives. With implementation of proposed and required mitigation measures, dust levels would stay below regulatory standards.

## **3.5 Citations**

Puget Sound Air Pollution Control Agency. 1997. Air quality summary reports, 1997 data summary. Obtained from the Internet at [www.psapca.org/airreport.htm](http://www.psapca.org/airreport.htm).

U.S. Environmental Protection Agency. 1992. Screening procedures for estimating the air quality impact of stationary sources, revised. Office of Air Quality Planning and Standards.

U.S. Environmental Protection Agency. 1997. Compilation of air pollutant emission factors. 5<sup>th</sup> edition and supplements. Office of Air Quality Planning and Standards.

Washington State Department of Ecology. 1999. 1997 air quality data summary. Air Quality Program.

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**Table 3-1. Ambient Air Quality Standards**

Pollutant	National		Washington State
	Primary	Secondary	
Total Suspended Particulates			
Annual Geometric Mean	no standard	No standard	60 µg/m <sup>3</sup>
24-Hour Average	no standard	No standard	150 µg/m <sup>3</sup>
Lead (Pb)			
Quarterly Average	1.5 µg/m <sup>3</sup>	1.5 µg/m <sup>3</sup>	no standard
Particulates			
PM <sub>10</sub>			
Annual Arithmetic Mean	50 µg/m <sup>3</sup>	50 µg/m <sup>3</sup>	50 µg/m <sup>3</sup>
24-Hour Average	150 µg/m <sup>3</sup>	150 µg/m <sup>3</sup>	150 µg/m <sup>3</sup>
PM <sub>2.5</sub>			
Annual Arithmetic Mean	15 µg/m <sup>3</sup>	15 µg/m <sup>3</sup>	no standard
24-Hour Average	65 µg/m <sup>3</sup>	65 µg/m <sup>3</sup>	no standard
Sulfur Dioxide (SO <sub>2</sub> )			
Annual Average	0.03 ppm	No standard	0.02 ppm
24-Hour Average	0.14 ppm	No standard	0.10 ppm
3-Hour Average	no standard	0.50 ppm	no standard
1-Hour Average	no standard	No standard	0.40 ppm <sup>a</sup>
Carbon Monoxide (CO) <sup>b</sup>			
8-Hour Average	9 ppm	9 ppm	9 ppm
1-Hour Average	35 ppm	35 ppm	35 ppm
Ozone (O <sub>3</sub> ) <sup>b</sup>			
1-Hour Average <sup>c</sup>	0.12 ppm	0.12 ppm	0.12 ppm
8-Hour Average	0.08 ppm	0.08 ppm	no standard
Nitrogen Dioxide (NO <sub>2</sub> )			
Annual Average	0.053 ppm	0.053 ppm	0.05 ppm
Notes:			
<sup>a</sup> 0.25 not to be exceeded more than two times in any 7 consecutive days.			
<sup>b</sup> Primary standards are listed in this table as they appear in the federal regulations, ambient concentrations are rounded using the next higher decimal place to determine whether a standard has been exceeded. The data charts in this report are shown with these unrounded numbers.			
<sup>c</sup> Not to be exceeded on more than 1.0 days per calendar year as determined under the conditions indicated in Chapter 173-475 WAC.			
ppm = parts per million			
µg/m3 = micrograms per cubic meter			
Annual standards never to be exceeded, short-term standards not to be exceeded more than once per year unless noted.			
Source: Washington State Department of Ecology 1999.			

**Table 3-2. Production Rates Used  
for Emission Calculations**

	<i>Maximum Daily Capacity (tpd)</i>	<i>Maximum Annual Capacity (tpy)</i>
<b>Proposed Action</b>	40,000	7.5 million
<b>Alternative 1</b>	20,000 (weekdays) 10,000 (Saturdays)	5.72 million
<b>Alternative 2</b>	10,000	3.12 million

**Table 3-3. Peak Year PM<sub>10</sub> Emission Rates Used  
to Model Potential Impacts**

<i>Activity</i>	<i>Proposed Action</i>		<i>Alternative 1</i>		<i>Alternative 2</i>	
	<i>Lbs/day</i>	<i>(tons/yr)</i>	<i>lbs/day</i>	<i>(tons/yr)</i>	<i>lbs/day</i>	<i>(tons/yr)</i>
<b>Haul Roads</b>	48.9	(7.6)	36.7	(5.7)	12.2	(1.9)
<b>Dozer Operations</b>	28.2	(4.4)	21.2	(3.3)	7.1	(1.1)
<b>Totals</b>	77.1	(12.0)	57.9	(9.0)	19.3	(3.0)

**Table 3-4. Maximum Modeled PM<sub>10</sub> Concentrations  
(24-Hour Averages)**

<i>Alternatives</i>	<i>Ambient AQ Standard (<b>mg</b>/m<sup>3</sup>)</i>	<i>Maximum PM10 Concentrations*</i>		<i>Impact</i>
		<i>At Property Line</i>	<i>At Nearest Residences</i>	
<i>Proposed Action</i>				
Scenario 1	150	118	112-116	no
Scenario 2	150	118	111-112	no
Scenario 3	150	119	108-115	no
<i>Alternative 1</i>	150	99	87-94	no
<i>Alternative 2</i>	150	83	77-80	no
* Includes 48 µg/m <sup>3</sup> background concentration.				

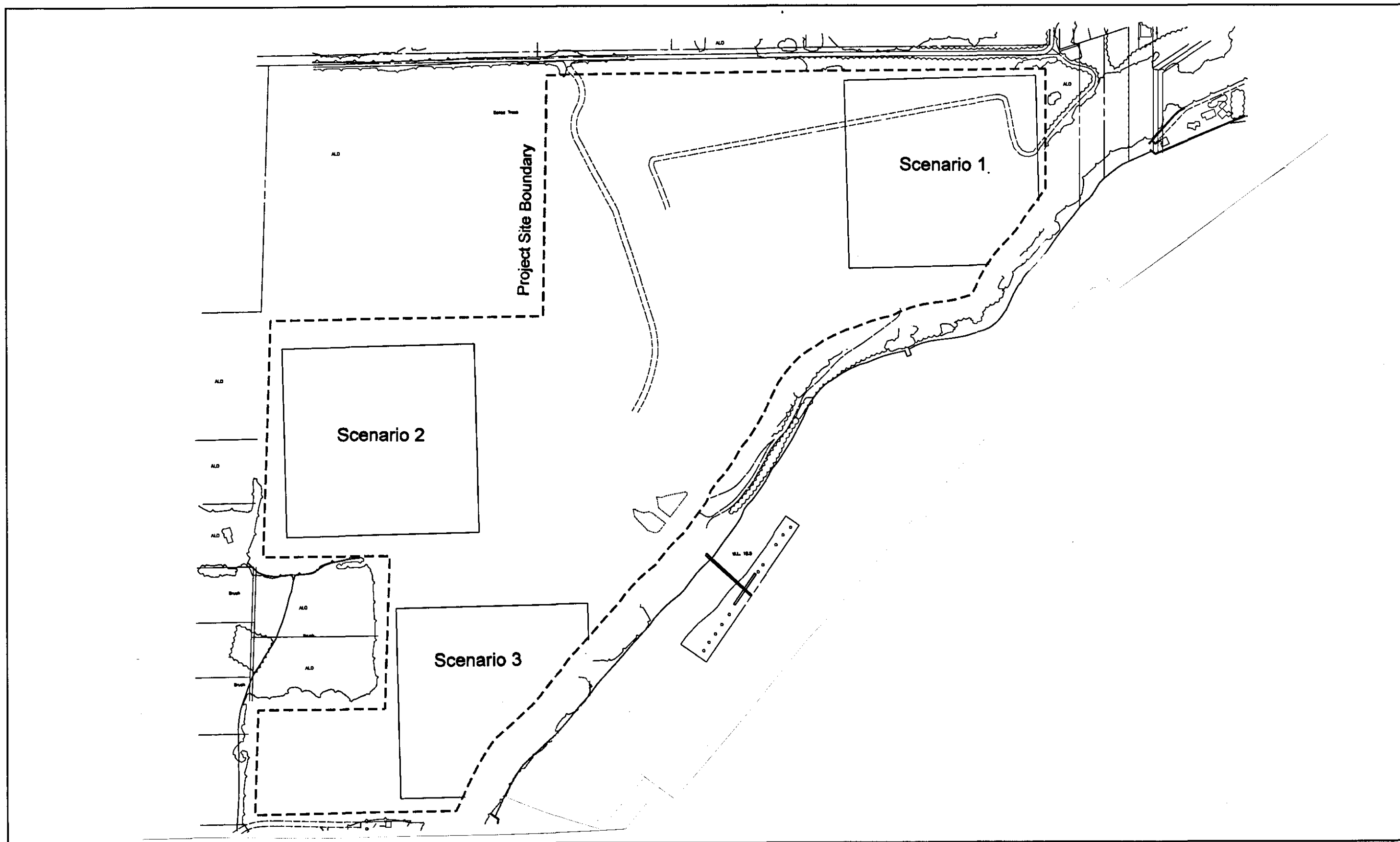


Figure 3-1. Air Quality Modeling Scenarios